

severe storm over Ireland and the hurricane *H* central near the Bahamas, while high pressures prevailed between these two depressions as also over central Europe and over the United States. From the 25th to the 30th *I G* broke up into several whirls, some of which moved northeastward over Sweden and others lingered in the neighborhood of Great Britain. Among the vessels that encountered the low areas *I* and *I G* were the *Obdam*, *Hecla* and *Meier* on the 18th; *Brazilian* and *Pomeranian* on the 19th; *Bayonne* and *Zaan-dam* on the 20th; *Hecla* and *Suram* on the 23d; *Pomeranian*, *Manitoba*, *Venetia*, *Donau*, and *Acme* on the 24th; *Venetia* and *Christine* on the 25th.

OCEAN FOG.

The limits of fog belts west of the fortieth meridian, as reported by shipmasters, are shown on Chart I by dotted shading. Near the Banks of Newfoundland fog was reported on 13 dates; between the fifty-fifth and sixty-fifth meridians on 5 dates; and west of the sixty-fifth meridian on 3 dates. Compared with the corresponding month of the last seven years, the dates of occurrence of fog near the Grand Banks numbered 1 less than the average; between the fifty-fifth and sixty-fifth meridians, 1 more than the average; and west of the sixty-fifth meridian, the number was the average for October.

OCEAN ICE.

The positions of icebergs and field ice reported for October, 1894, are shown on Chart I by crosses.

The following table shows the southern and eastern limits of the regions within which icebergs or field ice were reported for this month during the last twelve years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
October, 1883.....	46 56	46 22	October, 1883.....	46 56	42 22
October, 1884.....	Off Cape Race.		October, 1884.....	46 56	50 55
October, 1885.....	48 21	47 12	October, 1885.....	48 21	47 12
October, 1886.....	41 34	49 43	October, 1886.....	46 03	46 37
October, 1887.....	42 58	50 02	October, 1887.....	42 58	50 02
October, 1888.....	51 43	55 36	October, 1888.....	51 43	55 36
October, 1889.....	44 32	49 28	October, 1889.....	46 30	45 59
October, 1890.....	44 47	49 33	October, 1890.....	47 56	45 45
October, 1891.....	48 04	48 27	October, 1891.....	48 04	48 27
October, 1892.....	Straits of Belle Isle		October, 1892.....	52 34	51 00
October, 1893.....	49 57	59 32	October, 1893.....	52 47	51 16
October, 1894.....	45 11	49 05	October, 1894.....	48 33	48 10
Mean.....	46 24	50 30	Mean.....	48 17	48 37

Ice was reported south of the fiftieth parallel on 11 dates: 1st, 2d, 3d, 4th, 11th, 12th, 13th, 14th, 16th, 19th, and 21st. For October, 1893, ice was reported south of the fiftieth parallel only on 2 dates. In an area extending from the Straits of Belle Isle to near the fifty-second meridian ice was reported on 6 dates: 1st, 2d, 5th, 6th, 10th, and 11th. The southern limit of ice was about one and one-half degrees south of the average southern limit for October; and the easternmost ice reported was about one-half degree east of the average.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The distribution of the monthly mean temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart II; the lines are drawn over the high irregular surface of the Rocky Mountain plateau, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

DIURNAL PERIODICITY.

The regular diurnal period in temperature is shown by the hourly means given in Table V for all stations having self-registers.

NORMAL TEMPERATURE.

In Table II, for voluntary observers, the mean temperature is given for each station, but in Table I, for the regular stations of the Weather Bureau, both the mean temperatures and the departures from the normal are given for the current month. In the latter table the stations are grouped by geographical districts, for each of which is given the average temperature and departure from the normal; the normal for any district or station may be found by adding the departures to the current average when the latter is below the normal and by subtracting when it is above.

DEPARTURES FROM NORMAL TEMPERATURE FOR OCTOBER, 1894.

As compared with the normal for October the mean temperatures for the current month were decidedly in excess in Ontario, Quebec, and southwestward to Kansas, Nebraska, and Texas. The ridge of greatest excess includes the following: Rockliffe, 5.2; Chatham, 4.2; Kingston, 4.0; Parry Sound, 4.3; Topeka, 5.8; Wichita, 3.7; Dodge City and Abilene, 3.6.

Considered by districts, the mean temperatures for the current month show the following departures from normal temperatures:

Positive departures: New England, 2.1; middle Atlantic, 0.9; west Gulf, 1.1; Ohio Valley and Tennessee, 0.7; lower Lake, 2.0; upper Lake, 1.7; North Dakota (extreme northwest), 1.4; upper Mississippi, 1.3; Missouri Valley, 2.4; northern slope, 2.0; middle slope, 3.2; southern slope (Abilene), 3.6; southern plateau, 2.2; middle plateau, 1.8; northern plateau, 0.2; north Pacific, 1.0; south Atlantic, 0.0.

Negative departures: Key West, 1.3; east Gulf, 0.3; north Pacific, 1.4; southern Pacific, 0.3.

For certain voluntary stations of rather long periods of observation the normal and extreme mean temperatures and the departures are shown in detail in Table X a, which is now placed among the meteorological tables instead of being inserted in the text as heretofore.

YEARS OF HIGHEST MEAN TEMPERATURE FOR OCTOBER.

The mean temperature for October, 1894, was the highest on record at regular Weather Bureau stations as shown in the following table, which also gives the highest previous record:

Stations.	October, 1894.		Highest previous.	
	Mean temperature.	Departure from normal.	Temperature.	Year.
Corpus Christi, Tex.....	74.8	+1.8	74.7	1892
Palestine, Tex.....	69.8	+3.1	69.7	1893
Abilene, Tex.....	68.8	+3.6	67.1	1893
Wichita, Kans.....	61.4	+3.7	59.8	1893
Topeka, Kans.....	59.9	+5.8	59.3	1892
Kansas City, Mo.....	59.4	+2.9	59.0	1892
Pueblo, Colo.....	54.4	+2.4	53.2	1889
Cheyenne, Wyo.....	49.2	+3.2	48.3	1875
Parkersburg, W. Va.....	56.0	+1.7	55.6	1893
Vineyard Haven, Mass.....	56.6	+3.5	56.4	1893
Nantucket, Mass.....	54.9	+1.1	54.2	1893
Northfield, Vt.....	47.8	+3.7	47.6	1893

YEARS OF LOWEST MEAN TEMPERATURE FOR OCTOBER.

The mean temperature for October, 1894, was not the lowest on record at any regular Weather Bureau stations.

MAXIMUM TEMPERATURE.

The maximum temperatures of the month at regular stations of the Weather Bureau are given in Table I, from which it appears that the highest maxima were: Yuma, 101; Tucson, 97; Los Angeles, 96; Red Bluff, 95; San Luis Obispo, 94; Abilene, 93; Sacramento, Fresno, and Oklahoma, 92; El Paso, 91; Corpus Christi, Montgomery, and Jacksonville, 90.

The lowest maxima were: Tatoosh Island, 58; Eastport, 61; Port Crescent, 62; Port Angeles, 63; Neah Bay, East Clallam, and Sault Ste. Marie, 64; Pysht, 65; Fort Canby, 66.

YEARS OF HIGHEST MAXIMUM TEMPERATURE FOR OCTOBER.

The maximum temperatures for October were the highest on record at regular Weather Bureau stations, as shown in the following table:

Stations.	October, 1894.		Highest previous.	
	Maximum.	Excess above previous record.	Temperature.	Year.
Tucson, Ariz.....	97	0	97	1881
Corpus Christi, Tex.....	90	0	90	*
San Francisco, Cal.....	89	+ 2	87	*

* Frequently.

MINIMUM TEMPERATURE.

The minimum temperatures of the month at regular stations of the Weather Bureau are given in Table I, from which it appears that the lowest minima were: Lander, 15; Helena, 16; Idaho Falls and North Platte, 18; St. Vincent, 19; Pueblo and Valentine, 20; Denver, Cheyenne, Santa Fe, Bismarck, and Williston, 21.

Among the highest minima were: Key West, 70; Jupiter, 62; Tampa, 57; Titusville, 56; Jacksonville and Port Eads, 52; Charleston and Pensacola, 50.

YEARS OF LOWEST MINIMUM TEMPERATURE FOR OCTOBER.

The minimum temperatures for October were the lowest on record at regular Weather Bureau stations, as shown in the following table:

Stations.	October, 1894.		Lowest previous.	
	Minimum.	Deficit below previous record.	Temperature.	Year.
San Diego, Cal.....	45	0	45	1872

MONTHLY MEAN TEMPERATURE.

For the regular stations of the Weather Bureau the monthly mean temperature is the simple mean of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

During October, 1894, the highest mean temperatures at regular Weather Bureau stations were: Key West, 77.7; Jupiter, 76.0; Corpus Christi, 74.8; Yuma, 74.6; Galveston, 74.4. The lowest mean temperatures were: St. Vincent, 42.4; Havre, 45.0; Bismarck, 45.1; Port Crescent, 45.2; Pysht and Port Angeles, 46.8.

DAILY AND MONTHLY RANGES OF TEMPERATURE.

The greatest daily range of temperature is given for each of the regular Weather Bureau stations in Table I, which also gives data from which may be computed the extreme monthly ranges for each station:

Greatest daily ranges.—Large values: Rapid City, 52; North Platte, 51; Pueblo, 50; Valentine, 49; Lander, 48; Idaho Falls, 47; Denver and Winnemucca, 46; Tucson and Fort Smith, 45; Abilene and Dubuque, 44; Havre, 43; Yuma,

Carson City, Topeka, Huron, St. Vincent, and La Crosse, 42. Small values: Tatoosh Island, 12; Key West, 15; Hatteras and Fort Canby, 16; Block Island, 17; Nantucket, Astoria, and Port Angeles, 18; Jupiter, 19; Galveston and Seattle, 20.

Extreme monthly ranges.—Large values: Pierre, 66; Valentine and North Platte, 65; Pueblo, 64; Topeka, 61; El Paso, 60. Small values: Key West, 17; Tatoosh Island, 18; Fort Canby, 24; Jupiter, 25; Nantucket, 28; Block Island, 29.

LIMITS OF FREEZING TEMPERATURE.

The region within which the air has had a freezing temperature at some time during the month is bounded by the isotherm of minimum 32°. The isotherm of minimum 40° presents, approximately, the boundary of the region within which severe frosts are likely to have occurred. During the winter season these lines are shown on the chart of snowfall, No. V.

The line of minimum 40° passes from Delaware southwest to northern Georgia, and thence west to central Texas.

The line of minimum 32° passes from northern Maine southwest to northern Texas, and thence northwest to Alberta.

ACCUMULATED TEMPERATURES.

From January 1 to the end of the current month the average temperature for each geographical district was above or below the normal by an amount that is given in the last column of the following table. The accumulated monthly departures from normal temperatures, as given in the second column, may be used for comparison with the departures of current conditions of vegetation from the normal conditions.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
New England.....	0	0	Key West.....	- 5.9	- 0.6
Middle Atlantic.....	-12.6	+ 1.3	Southern plateau.....	-14.5	- 1.4
South Atlantic.....	-16.1	+ 1.6	Middle plateau.....	- 8.7	- 0.9
East Gulf.....	- 7.0	+ 0.7	Northern plateau.....	- 3.8	- 0.4
West Gulf.....	- 0.1	0.0	Northern Pacific.....	- 9.0	- 0.9
Ohio Valley and Tennessee.....	- 0.9	+ 0.1	Middle Pacific.....	-10.5	- 1.0
Upper Lake.....	-15.5	+ 1.6	Southern Pacific.....	-21.9	- 2.2
Lower Lake.....	-24.7	+ 2.5			
Upper Lake.....	-29.1	+ 2.9			
North Dakota (Ex. NW.).....	-25.5	+ 2.6			
Upper Mississippi.....	-26.0	+ 2.6			
Missouri Valley.....	-22.6	+ 2.3			
Northern slope.....	- 6.1	+ 0.6			
Middle slope.....	- 7.9	+ 0.8			
Southern slope (Abilene).....	- 4.9	+ 0.5			

PERIODS OF HIGH TEMPERATURE.

The maximum temperatures of October occurred principally at the following periods:

(A) On the 1st the maximum temperature of the month occurred in Mississippi, Alabama, and North and South Carolina. On the 2d this warm wave had extended northward so as to affect the greater part of the Gulf and south Atlantic States, on the 3d it covered the middle Atlantic States, and on the 4th southern New England.

(B) The maximum temperature of the month occurred on the 3d at a few stations in Washington, Oregon, and California, and on the 4th throughout nearly the whole of the Pacific States and Arizona; on the 5th and 6th this warm wave reached New Mexico and Colorado.

(C) On the 15th the highest temperatures occurred in the northern portions of Minnesota and Montana. During the 16th this warm wave spread southward into Nevada, Idaho, Wyoming, South Dakota, Iowa, Wisconsin, Michigan, and Lake Huron. This southward movement continued, and by the 19th or 20th had covered Kansas, Indian Territory, Missouri, Illinois, Indiana, and northern New England. This was the closing warm wave of the month, and it ended by

bringing the maximum temperature of the month to Arkansas on the 23d.

PERIODS OF LOW TEMPERATURE.

The minimum temperatures of October occurred principally at the following periods:

(A) On the 7th in Montana and Idaho, and on the 8th or 9th at a few stations in South Dakota, Nebraska, Missouri, Wisconsin, and Upper Michigan.

(B) On the 13th or 14th the minimum of the month generally occurred throughout the upper Mississippi Valley and the upper Lake region; this low temperature moved southward, and by the 15th had brought the minimum temperature to Tennessee, Alabama, Georgia, the interior of North and South Carolina, and the greater part of the Appalachian region and southern New England. On the 16th the minima occurred along the entire coast from South Carolina to Maine.

(C) On the 28th the lowest temperatures occurred at Salt Lake City, Laramie, Sacramento, and Fresno. By the 29th this low temperature had spread southward over portions of Arizona, New Mexico, and Colorado, and by the 30th over Texas, Louisiana, Kansas, and North and South Dakota, and by the 31st over Missouri, Arkansas, and northern Florida.

REGIONS OF 20° RISE IN TWENTY-FOUR HOURS.

The daily weather charts show by heavy dotted lines the regions within which the temperature has risen 20° in the preceding twenty-four hours. The following list enumerates all of these regions and gives the dimensions of the principal axes in miles:

(A) 1st, a. m., Colorado and Nebraska, 500 by 200.

(B) 2d, a. m., Illinois and Wisconsin, 300 by 100.

(C) 3d, a. m., West Virginia and Ohio, 200 by 100.

(D) 8th, p. m., Montana and Nebraska, 400 by 100; 9th, a. m., South Dakota, Wyoming, and Colorado, 500 by 300. This area of rising temperature in advance of high area No. IV, and in the rear of low No. VII, which was then central in Manitoba, can hardly be explained, except as being due to the dynamic warming of the descending air.

(E) 16th, a. m., Kentucky, Indiana, and Ohio, 300 by 200. This is a case of a warm area between high pressure No. V on the south and low No. XI on the north; southerly winds and cloudy morning skies were followed by southerly winds with a clear sky. The warm area was on the north or descending side of the Appalachians, and if there was a slight dynamic warming, it must have been superadded to the clear sunshine.

(F) 20th, a. m., 100 by 200, Manitoba and Minnesota. This rise of 20° must be attributed to the change from cold northeast winds and clear sky to warm southerly winds and cloudy weather.

(G) 23d, a. m., 300 by 200, western Montana. This warm area was immediately to the south of low No. XVI, which was then central in Assiniboia and Alberta; southerly winds were blowing down the northern Rocky Mountain slope; the clear skies had become clouded and rain was rapidly approaching; sunshine had been cut off from the surface of the ground, but the protection from radiation and the direct radiated heat from the clouds and the dynamic warming of the chinook wind must have combined to produce this rise in temperature. 24th, a. m., the rise in temperature shown by the preceding map extended rapidly south and east, and now covered the region from Assiniboia to Kansas and Wyoming, averaging 400 by 600. The maximum rise in temperature in twenty-four hours was 32°, at Rapid City, where the sky had remained clear throughout with southerly winds, so that no doubt can remain that high area No. X, off the coast of California, which produced the southwest winds and rain throughout the western Rocky Mountain slope, as shown on this map, was now producing the föehn wind on the eastern slope.

(H) 30th, a. m., 400 by 200, Montana and Assiniboia; the maximum rise in twenty-four hours was 24° at Havre and Swift Current. This warm region was located with reference to low No. XVIII, precisely as was the preceding region (G) with reference to its low area, and the rise in temperature must have been principally of dynamic origin.

(I) 31, a. m., 300 by 100, Nebraska and South Dakota. This warm region represented a change from cold westerly winds and clear sky to warm northwest winds and partly cloudy weather; the greatest rise was 24° at Valentine. On the 31st, p. m., this area appeared in Missouri, 300 by 100.

REGIONS OF 20° FALL IN TWENTY-FOUR HOURS.

A fall of temperature of 20°, or more, in twenty-four hours is indicated on the Daily Weather Map by inclosing the region within which this occurs by a heavy dotted line. According to recent instructions such falls are no longer to be regarded as technical cold waves, the exact definition of which is given in the subsequent paragraph. The following list enumerates the regions of 20° fall for the month of October and the dimensions of the principal axes are stated in miles:

(A) 1st, a. m., 400 by 100, Lake Huron and Ohio.

(B) 3d, p. m., 200 by 100, Iowa, Illinois, and Wisconsin.

(C) 6th, p. m., 800 by 400, Montana, Idaho, Wyoming, and western Nebraska. 7th, a. m., 300 by 300, Wyoming and Colorado; 7th, p. m., 800 by 300, Wisconsin, Iowa, Nebraska, Kansas, Colorado, and Texas. 8th, a. m., three small areas, 100 by 100, Minnesota; 300 by 200, Missouri, and 100 by 100 in Indian Territory; 8th, p. m., two small areas, 200 by 100, Indiana and Ohio; 100 by 100, Mississippi. 9th, a. m., two small areas, 100 by 100, Ohio; 200 by 200, Mississippi.

(D) 10th, a. m., 400 by 200, Wyoming and Colorado.

(E) 16th, p. m., 200 by 100, Assiniboia. 17th, a. m., 200 by 300, Alberta and Saskatchewan.

(F) 25th, p. m., 100 by 100, South Dakota. 26th, a. m., 600 by 400, South Dakota, Nebraska, Kansas, Colorado, and Indian Territory.

(G) 28th, a. m., 300 by 200, Utah and Colorado; 28th, p. m., three areas stretching almost continuously from Minnesota to central Texas, 1,100 by 200. 29th, a. m., 100 by 100, northern Texas; 29th, p. m., 100 by 200, Illinois.

(H) 31st, a. m., 300 by 300, Alberta, Assiniboia, and Montana.

COLD-WAVE SIGNALS FOR OCTOBER.

According to recent instructions (No. 75 of 1894) the cold-wave signal, namely, the white flag with black center, will be displayed during the months of March to November, inclusive, whenever, in the judgment of the forecast official, the fall of temperature in twenty-four hours is expected to be at least 18° and to reach at least 32° in the district north of Arkansas and between the Mississippi River and the Rocky Mountains, including Minnesota; at least 16° and to reach 36°, in the region of Tennessee and North Carolina and east of the Mississippi River, including St. Louis; at least 16° and to reach 40°, in all other districts east of the Rocky Mountains, except along the Gulf coast and in Florida; at least 16° and to reach 42°, along the Gulf coast and in Florida. During the months of December, January, and February the first limit remains the same, but the second limit is placed 6° lower. When cold-wave signals are not ordered and the temperature falls 4° more than the first limit and reaches to 4° below the second limit, such falls will be considered as cold waves without signals.

In accordance with these instructions, the following cold-wave signals were ordered during the month of October:

6th, p. m., Huron and Moorhead.

7th, a. m., Yankton, Omaha, Concordia, Wichita, Topeka, St. Paul, Minneapolis, Des Moines, Dubuque, Davenport, Keokuk, Sioux City, and La Crosse.

25th, a. m., Rapid City, Pierre, Huron, Yankton, Denver, Pueblo, Valentine, North Platte, Omaha, Concordia, Wichita, Dodge City, and Kansas City.

27th, a. m., Rapid City, Cheyenne, Denver, and Pueblo.

28th, a. m., Omaha, Concordia, Wichita, Topeka, St. Paul, Moorhead, Duluth, Minneapolis, Des Moines, Dubuque, Davenport, Keokuk, Sioux City, Springfield, Mo., Columbia, Kansas City, and La Crosse.

DEW AND HOAR FROST.

The invisible moisture in the atmosphere condenses upon cold surfaces when the latter are cooled below the so-called dew-point. No method of measuring the amount of this deposition has as yet been introduced into use at Weather Bureau stations owing, in part, to the necessary delicacy and expense of the apparatus. This deposit of dew is quickly evaporated by the wind and sunshine; it is, therefore, only a temporary abstraction from the atmosphere; it does not enter into the sap of a plant unless it drops on the ground and penetrates as water to the roots. When frost-work and dew are deposited on elevated and dry places, such as the tops of houses, rocks, and mountains, the vapor may be considered as abstracted from the free atmosphere, but when they are deposited near the surface of the ground in damp, wet places, the vapor must be considered from the following different point of view. There is a steady and slow movement of the water from the lower strata of the soil up toward the surface where it is evaporated into the free atmosphere; during the daytime the wind carries this moisture away, but during the nighttime the still air near the surface of the ground becomes saturated for two reasons, namely, first, it is cooled by contact with the cool ground and, second, the moisture from the warm layers of soil a few inches below the surface continues to rise, and as it is not carried away by the wind, saturates the adjacent air and deposits itself, either as dew or frost, upon every blade of grass, or, as ice needles just below the topmost layer of gravel; such deposits are, therefore, simply one step in the transition from soil water to atmospheric vapor. The ice formation is oftentimes very important; a mass of needles, several inches high and covering a large area almost continuously, represents a layer of water of that depth and shows how much moisture would be given up by the soil to the air were it not retained by freezing at the surface. These ice needles are eventually thawed in the sunshine and, at least in part, remain in the soil as water. The frozen ground, or "depth to which frost penetrates," presents a similar case of soil moisture converted into ice on its way up into the atmosphere, and which by being frozen is not only itself saved to the soil, but becomes a barrier that prevents the water at greater depths from being lost during the winter, and in this respect, therefore, acts as beneficially as a layer of snow.

Observers who can keep a record of the amounts of dew, or frost, or the depth of frozen ground, would confer a favor by reporting these items from month to month.

FROSTS.

The frosts reported by the voluntary observers of the Weather Bureau usually have reference to the injury done to tender plants, and the classification "light" or "heavy" depends almost entirely upon the nature of the plant. In general, it may be assumed that a light frost will injure the most sensitive vegetables that are raised by methods of forcing, while the heavy frosts will injure hardy fruits and grains that ripen in the open air. In both cases, however, the extent of the injury will largely depend upon the location of the plant, namely, whether in a quiet valley or on an elevated spot. The meteorological phenomenon of hoar frost accompanies the occurrence of a frost properly so called by the agriculturist; a freezing temperature without hoar frost is a

dry freeze or a cold wave, according to its intensity. The isotherms of minimum 40° and minimum 32° are shown on Chart V.

The principal frosts of October occurred in the southern portion of the United States as follows; Alabama, 10th, 31st; Arkansas, 9th, 30th; Georgia, 14th, 16th; Louisiana, 9th, 30th; New Mexico, 28th, 29th; Texas, 29th, 30th; California, 28th, 29th.

The following table shows the dates of the occurrence of the first light and heavy frosts and the first snow of the season at the respective stations. When the observer makes no mention of frost the first occurrence of a minimum temperature of 32° is selected and the date is given in the table. The dagger at the right of the name of the station indicates, therefore, a minimum temperature of 32° with or without frost:

Dates of first light and heavy frosts and snow, October, 1894.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
<i>Alabama.</i>				<i>Colorado—Cont'd.</i>			
Brewton†	31	30		Hugo†		30	
Carrollton†	10			Husted			28
Decatur	15			Julesburg		6	
Evergreen	15			Kit Carson†		16	
Florence	10			Las Animas†		3	
Greensboro	10			Loveland		7	
Maple Grove	10	15		Pagoda (near)			26
Mobile	31			Paonia		28	
Montgomery	10			Pueblo		8	
Mount Willing	10			San Luis			28
Newbern	10			Seibert		6	
Newburg		9		Thon			28
Oneonta†		15		Vernon		7	
Opelika		31		<i>Connecticut.</i>			
Rock Mills	10			Bridgeport			
Scottsboro	14			Canton		16	
Union	10			Hartford		16	
Union Springs	15			Middletown		16	
Valley Head	6	14		New Hartford		16	
<i>Arizona.</i>				New Haven		16	
Rye		29		New London			
Wilgus	1			North Grosvenor Dale†		7	
<i>Arkansas.</i>				Norwalk		19	
Bee Branch		8		Southington		7	
Blanchard Springs		9		South Manchester		16	
Camden	9	30		Voluntown		12	
Conway		9		Waterbury†		7	
Corning		9		<i>Delaware.</i>			
Fayetteville	5	8		Milford		12	
Fort Smith		9		Millsboro		15	
Hot Springs†		31		Newark		12	
Keesee Ferry		8		Seaford		12	
Kirby†		30		<i>District of Columbia.</i>			
Little Rock	9	30		Washington		7	15
Lonoke		9		<i>Georgia.</i>			
Luna Landing	9	31		Adairsville			15
Malvern	9			Athens		14	
Mount Ida		9		Atlanta		14	
New Gascony	9	31		Augusta		16	
Newport		9		Blakely		31	
Osceola	9			Brag		15	
Ozark		9		Clayton		6	14
Pine Bluff		31		Dahlgren		5	15
Pocahontas		8		Diamond		6	18
Pescott		9	30	Dublin		16	
Rison	9	30		Forayth		15	
Russellville	9	30		Griffin		30	
Stuttgart	9	30		Hephzibah		15	
Texarkana†		30		Lafayette†		6	15
Washington		9		Lagrange		14	
Winslow		9		Marietta		14	
<i>California.</i>				Marshallville		15	
Ager†		26		Morgan		10	31
Cedarville		5		Ramsey		5	6
Centerville	27			Rome		14	15
Cloverdale	11			Thomasville		31	
Edmonton			20	Toccoa†			15
Healdsburg	12			Waynesboro		16	
Independence		1		<i>Idaho.</i>			
Kernville	1			Fraser			20
Neenach†		29		Idaho Falls			27
Sacramento (V. O.)	28			Lewiston†		7	
Santa Clara†		28		Martin			19
Shasta Springs		25		Payette		5	
<i>Colorado.</i>				<i>Illinois.</i>			
Abbott			28	Albion			14
Breckenridge			1	Aurora			6
Byers†		27		Bradwood			14
Cope†		7		Cashnell			14
Denver		7		Cairo		9	14
Divide Exper'l Station			27	Carlinville			9
Deer Trail†		7		Carrollton			9
Dumont			28	Chicago			1
First View†		7		Decatur			9
Fleming		7		East Peoria			6
Gold Hill†		2		Fort Sheridan			14
Grand Junction†		28		Galva			6

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
<i>Illinois—Cont'd.</i>				<i>Iowa—Cont'd.</i>			
Golconda.....		11		Ogden.....		8	
Greenville.....		30		Osceola.....		8	
Griggsville.....		30		Oskaloosa.....		9	
Havana.....		30		Ottumwa.....		9	
Herrins Prairie.....		30		Ovid.....		29	
Jordans Grove.....		9		Panama.....		29	
Lagrange.....		14		Richland.....		6	
Louisville.....		9		Rock Rapids.....		29	
Martinsville.....		1		Sac City.....		29	
Mascoutah.....		14		Seymour.....		9	
Mattoon.....		9		Sibley.....		29	
Monmouth.....		6		Sioux City.....		29	
Mount Pulaski.....		9		Spirit Lake.....		3	
Olney.....		14		Toledo.....		9	
Ottawa.....		6		Villisca.....		28	
Palestine.....		10		Washington.....		9	
Peoria.....		14		Waukegan.....		30	
Phil.....		1		Webster City.....		31	
Rantoul.....		1		Wilcox.....		6	
Riley.....		6		Winteret.....		30	
St. John.....		14		<i>Kansas.</i>			
Springfield.....	6			Abilene.....		8	
Sycamore.....		9		Allison.....		28	
Tuscola.....		14	30	Altamont.....		8	
Walnut.....		6		Atchison.....		30	
Zion.....		9	30	Beloit.....		7	
<i>Indiana.</i>				Blaine.....		29	
Angola.....		14		Burlington.....		8	
Bedford.....		6		Colby.....		28	
Cambridge City.....		6		Coldwater.....		8	
Columbia City.....		14		Columbus.....		8	
Columbus.....		15		Concordia.....		8	
Connorsville.....		10		Coolidge.....		29	
Degonia Springs.....		14		Cunningham.....		8	
Delphi.....		10		Dodge City.....		8	
Evansville.....		14		Eldorado.....		29	
Farmland.....		9		Elk City.....		6	
Hammond.....		8		Englewood.....		10	
Huntingburg.....		5		Eureka Ranch.....		7	
Huntington.....		9	12	Garfield.....		8	
Indianapolis.....		6		Gibson.....		30	
Jeffersonville.....		6		Gove.....		8	
Kokomo.....		10		Grenola.....		8	
Lafayette.....		6		Horton.....		9	30
Madison.....		6		Hutchinson.....		8	
Marengo.....		6		Independence.....		8	
Marion.....		4		Ionian.....		1	
Mauzy.....		6		Jaqua.....		8	
New Albany.....		10		Johnson.....		8	
Plymouth.....		10		Kiowa.....		8	
Princeton.....		10		Lakin.....		28	
Rockville.....		6		Lebo.....		6	
Scottsburg.....		6		Mackaville.....		8	
Shelbyville.....		9		Marion.....		8	
South Bend.....		14		Morton.....		8	
Terre Haute.....		6		Mount Hope.....		8	
Vevay.....		14		Ness City.....		30	
Worthington.....		6		Olathe.....		30	
<i>Indian Territory.</i>				Oswego.....		8	
Enfauila.....	9	29		Rome.....		8	
Kemp.....		9		Sedan.....		8	
Lehigh.....	8	30		Topeka.....		8	
Purcell.....	9	30		Tribune.....		3	
Tahlequah.....	3	30		Ulysses.....		3	
<i>Iowa.</i>				Wakefield.....		30	
Afton.....		8	29	Wamego.....		8	
Alta.....			29	Washington.....		8	
Amana.....		6		Wellington.....		30	
Atlantic (near).....			28	Wichita.....		8	
Atlantic.....			28	Winfield.....		8	
Belle Plaine.....		9		Yates Center.....		8	
Bonaparte.....		9		<i>Kentucky.</i>			
Carroll.....		9		Alpha.....		5	
Cedar Rapids.....		5		Blandville.....		5	
Charles City.....		5		Bowling Green.....		5	
Clarinda.....		29	29	Caddo.....		15	
Clinton.....		6		Canton.....		14	
College Springs.....			29	Carrollton.....		9	
Corning.....		6	29	Cattlettsburg.....		6	
Davenport.....		6		Earlington.....		14	
Des Moines.....		14	30	Edmonton.....		10	
Emmettsburg.....		6	29	Eubank.....		5	
Fairfield.....		9		Fords Ferry.....		6	
Forest City.....		6		Franklin.....		25	
Fort Madison.....		9		Georgetown.....		9	
Glenwood.....		8	29	Greendale.....		15	
Grand Meadow.....		1	30	Greensburg.....		9	
Greenfield.....		4	29	Harrodsburg.....		6	
Hopeville.....		8	29	Louisville.....		9	
Hopkinton.....		14		Marionville.....		9	
Humboldt.....			3	Marshall.....		9	
Independence.....		6		Matlock.....		5	
Indianola.....		14		Mount Sterling.....		6	
Keokuk.....		9		Munfordville.....		15	
Keosauqua.....		9		Paducah.....		9	
Knoxville.....		14		Pellville.....		9	
Larrabee.....			29	Princeton.....		7	
Logan.....		8	29	Russellville.....		9	
Maxon.....		9		Shelby City.....		5	
Mechanicsville.....		6		Shelbyville.....		9	31
Mount Pleasant.....		8		Springfield.....		5	
Newton.....		9		Williamsburg.....		9	15

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
<i>Louisiana.</i>				<i>Michigan—Cont'd.</i>			
Abbeville.....		9		Ovid.....		15	
Alexandria.....		9		Parkville.....		7	
Amite.....		31		Port Huron.....		1	
Baton Rouge.....		30		Rockland.....		13	
Cameron.....		29		St. Johns.....		14	
Cheneyville.....		15		Sand Beach.....		14	
Clinton.....		15		Sault Ste. Marie.....		14	
Coushatta.....		14	30	Stanton.....		1	
Covington.....		14	30	Vandalia.....		14	
Delhi.....		9	30	<i>Minnesota.</i>			
Farmerville.....		9	30	Beardsley.....		7	
Franklin.....		30		Belle Plaine.....		3	
Houma.....		30		Bird Island.....		30	
Jeanerette.....		9	30	Blooming Prairie.....		3	
Lafayette.....		15		Bonniwells Mills.....		30	
Lake Providence.....		9		Cambridge.....		30	
Lawrence.....		30		Camden.....		29	
Liberty Hill.....		9	30	Campbell.....		7	
Melville.....		15	30	Clearwater.....		31	
Monroe.....		9	30	Collegeville.....		30	
Natchitoches.....		9		Crookston.....		7	
New Iberia.....		14		Duluth.....		10	
Opelousas.....		15		Farmington.....		7	
Oxford.....		9	30	Fergus Falls.....		7	
Paincourtville.....		9		Fort Ripley.....		7	
Plain Dealing.....		9	30	Granite Falls.....		7	
Rayne.....		30		Lake Winnibigoshish.....		13	
Shell Beach.....		30		Leech Lake.....		7	
Shreveport.....		9		Luverne.....		29	
Sugartown.....		29	30	Maple Plain.....		7	
Wallace.....		31		Minneapolis.....		1	29
<i>Maine.</i>				Montevideo.....		7	
Eastport.....		16		Moorhead.....		7	
Gardiner.....		15		Morris.....		7	
Madison.....		19		New Ulm.....		30	
Mayfield.....		8	15	Orionville.....		7	
North Bridgeton.....		16		Park Rapids.....		7	
West Jonesport.....		13		Pokegama Falls.....		7	
<i>Maryland.</i>				Red Lake.....		29	
Bachmans Valley.....		12		Rolling Green.....		30	
Baltimore.....		12		St. Cloud.....		30	
Boetherville.....		12		St. Olaf.....		7	
Charlotte Hall.....		14	15	St. Vincent.....		7	
College Park.....		12		Sandy Lake Dam.....		30	
Darlington.....		12		Sauk Center.....		29	
Easton.....		11		Two Harbors.....		29	
Fallston.....		12	15	Willmar.....		7	
Frederick.....		2		Winona.....		9	
La Plata.....		14		Worthington.....		3	
Mardela Springs.....		12	15	<i>Mississippi.</i>			
Mt. St. Marys College.....		12	15	Aberdeen.....		10	15
<i>Massachusetts.</i>				Agricultural College.....		6	
Oakland.....		12	14	Batesville.....		9	31
Pocomoke City.....		12	17	Briers.....		15	
Solomons.....		7		Canton.....		9	
Sunnyside.....		7	14	Columbus.....		10	
Taneytown.....		7		Crystal Springs.....		9	
Woodstock.....		7	16	Duck Hill.....		8	
<i>Massachusetts.</i>				Edwards.....		9	
Andover.....		16		Egypt.....		11	14
Boston.....		16		Enterprise.....		14	30
Brookton.....		16		Fayette.....		13	
Chestnut Hill.....		16		French Camps.....		9	
Fall River.....		12		Greenville.....		9	
Fitchburg.....		16		Hattiesburg.....		10	
Long Plain.....		19		Holly Springs.....		9	
Lowell.....		16		Jackson.....		31	
Ludlow Center.....		12	19	Logtown.....		31	
Mansfield.....		15		Louisville.....		10	31
Middleboro.....		15	16	Macon.....		31	
Milton.....		12		Meridian.....		10	
Monroe.....		15	14	Palo Alto.....		9	15
New Bedford.....		19		Stonington.....		9	
Somerset.....		19		Topton.....		10	
Taunton.....		7		Valden.....		6	31
Vineyard Haven.....		15		Vicksburg.....		9	
Wakefield.....		19		Water Valley.....		9	
Westboro.....		19		Waynesboro.....		9	31
Worcester.....		12		Woodville.....		9	
<i>Michigan.</i>				Yazoo City.....		9	
Allegan.....		1		<i>Missouri.</i>			
Ball Mountain.....		1		Akron.....		8	29
Berlin.....		14		Appleton City.....		8	
Birmingham.....		13		Arthur.....		7	
Boon.....		14		Bethany.....		9	
Calumet.....		9	8	Birch Tree.....		9	
Charlevoix.....		14		Bluffton.....		8	
Detroit.....		14		Brunswick.....		9	
Fairview.....		14	13	Carthage.....		8	
Grand Haven.....		15		Carrollton.....		8	
Grand Rapids.....		14		Columbia.....		5	
Grape.....		14		Conception.....		9	29
Grayling.....		15		Cowgill.....		8	
Hart.....		15		Darksville.....		8	
Hesperia.....		12		Downing.....		7	
Jeddo.....		14		East Lynne.....		31	
Kalamazoo.....		14		Eldon.....		4	
Lodi.....		14	14	Elmira.....		9	29
Marquette.....		14	8	Fairport.....		30	
Mayville.....		14		Farmersville.....		9	
Mottville.....		10	14	Fayette.....		5	9
Northport.....		14					
Old Mission.....		15					

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
Missouri—Cont'd.				Nebraska—Cont'd.			
Fox Creek †	8	9		State Farm			2
Fulton	19			Superior †		8	
Gallatin		31		Sutton			2
Gayoso		9		Turlington		8	
Glasgow	13	14		Valentine			2
Glensted	8			Weeping Water		31	
Gordonville		9		Nevada.			
Gorin	7	9		Battle Mountain		28	
Greenville	9	14		Belleville †		1	
Grove Dale		30		Downeyville †		1	
Half Way	5	8	29	Hot Springs †		28	
Hannibal		8		Osceola †		1	
Harrisonville		6		Paradise			2
Houston	1			New Hampshire.			
Houstonia (near)		8		Berlin Mills			1
Ironton		9		Bethlehem			1
Kansas City		8		Brookline		7	
Kidder		8		Dublin		12	
Lamar		3		Littleton			1
Lamonte	5	8		Stratford			1
La Plata		8		West Milan			1
Lebanon		9		New Jersey.			
Liberty		9	29	Allaire	7	12	
Linn Creek		9		Asbury Park		15	
McCune	9	11		Atlantic City	12		
Marceline	3	31		Bayonne	12	15	
Marshall †		8		Belvidere †		10	
Maryville		9	29	Beverly	12	16	
Mexico		8		Blairstown †		16	
Miami		8		Bridgeton	2		
Mine La Motte	8			Camden	12		
Mount Vernon		8		Cape May	15		
Nevada		8		Cape May C. H.		12	
New Hartford		9		Chester		15	
Oakfield		9		Dover	12	15	
Olden	5	8		Egg Harbor City		7	
Oregon		8	30	Elizabeth		12	
Palmyra		8		Franklin Furnace †		16	
Panacea	5	8		Franklinville		19	
Pickering			29	Freehold	2	12	
Platte River		8	29	Friesburg		17	
Poplar Bluff †		9		Gillette	11	20	
Polosi		9		Hightstown	12		
Princeton		9		Imlaystown	7		
St. Charles		9		Junction		16	
St. Louis	9			Millville		12	
Secaucus		8		Moorestown	12		
Sedalia †		31		Newark	12	12	
Springfield		8		Ocean City	15		
Steffenville		6		Oceanic	15		
Stellada		8		Pensauken	7		
Sublett		8		Plainfield	7	16	
Tindall		7		Rancocas	6		1
Unionville	7	8	29	River Vale †		8	
Warrensburg	5	8		Somerville		12	
Warrenton		8		South Orange		16	
Wheatland		8		Tenally	11	16	
Montana.				Toms River		16	1
Billings			6	Trenton		2	
Bozeman			26	Vineland	6	12	
Cascade			5	Woodbine †		11	
Cokedale			6	New Mexico.			
Fort Custer			6	Albert †		29	
Fort Keogh			1	Albuquerque		29	
Fort Missoula			27	Alma		28	
Glendive			2	Eddy	29		
Martinsdale			24	Fort Bayard †		29	
Mingusville			2	Fort Stanton †		22	
Nebraska.				Gallisteo †		29	
Agee			7	Gallinas Spring		8	
Ansley			28	Halls Peak			2
Arberville †			8	Los Lunas †		20	
Ashland			29	Monero			
Bassett			7	Rincon		21	
Beaver City			8	Roswell	7	29	
Bratton			7	San Marcial		29	
Burwell †			30	Santa Fe		2	
Cortland			6	New York.			
Crete †			8	Addison			1
Culbertson			28	Albany			1
David City			29	Alfred Center			1
Fort Robinson			28	Angelica			1
Geneva			28	Arcade			1
Haigler			27	Bedford		16	
Hartington			29	Binghamton		12	
Harvard			10	Brookfield			
Imperial †			7	Buffalo		15	
Kennedy			28	Canton			1
Kimball			28	Cooperstown		16	
Madrid			27	Fleming †		15	
Marquette			8	Fort Niagara †		29	
Minden			8	Friendship			1
Mullen †			6	Groversville			1
Nebraska City			29	Hess Road Station			1
Norfolk †			8	Honeymead Brook †		16	
North Platte			28	Humphrey			1
Omaha			8	Ithaca			1
Ough			30	Lebanon Springs			1
Palmer			30	Le Roy			1
Plattsmouth			29	Lockport			1
Seward			28	Lowville			1
Springview			3	Malone			1

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
New York—Cont'd.				Ohio—Cont'd.			
Massena			24	Cincinnati	6	10	
Minnewaska †		15		Clarksville		10	
New Lisbon			14	Cleveland	7	15	14
New York	12			Coalton		6	
North Hammond			14	Colebrook			14
Oswego			15	Columbus	7	15	
Perry City			14	Cynthiana		6	
Poughkeepsie †		7		Dayton		10	
Rochester			14	Demos		15	
Saranac Lake			15	Ellsworth		15	
South Canisteo			14	Findlay		14	
South Kortright			14	Fostoria †		14	
Stillwater †		19		Frankfort		7	
Turin			14	Garrettsville			14
Varysburg			14	Georgetown †		15	
Watertown			14	Granville		15	
Waverly			14	Gratiot		12	
North Carolina.				Greenfield †		15	
Asheville †		12		Green Hill		12	14
Auburn	12			Greenville †		15	
Bailey		15		Guyville †		15	
Bakersville		6		Hackney †		8	
Blowing Rock †		14		Hanging Rock †		9	
Bryson City		10		Hillhouse		15	
Chapel Hill	15			Hillsboro		6	
Charlotte	15			Hiram		15	14
Fair Bluff	16			Jacksonboro		14	
Fayetteville	15			Killbuck †		15	
Flat Rock	5	14		Logan		15	
Henderson	9			Lowell		8	
Highlands	6	12		McConnelsville		15	
Horse Cove	12	14		Marietta †		14	
Kittyhawk		16		Marion			5
Lenoir	6	12		Milfordton †		7	
Lilesville	15			Napoleon		15	
Littleton	14			New Berlin		12	
Louisburg	15			New Comerstown		15	
Lynn	31			New Waterford		12	
Mocksville	6	15		North Lewisburg		7	
Moncure	15			North Royalton †		15	
Morgantown †		15		Northwood		10	
Mount Airy	6	12		Norwalk		15	
Mount Pleasant †	12	15		Ohio State University		15	
Murphy	6	14		Orangeville		7	
Oak Ridge	12	15		Pataskala		12	
Pantego	15			Pomeroy †		9	
Pittsboro		15		Portsmouth		12	
Raleigh	15			Richwood			13
Rockingham	12			Ridge		9	
Roxboro †	12	15		Ripley		9	
Salisbury		15		Rittman		15	
Saxon		14		Rosewood		1	
Selma	15	15		Sandusky		15	
Sloan	15			Shenandoah †		14	
Soapstone M't.	12	15		Swanton			4
Tarboro		15		Thurman †		5	
Waynesville	5	6		Tiffin		1	13
Weldon		15		Toledo		15	
Willeyton		15		Upper Sandusky		1	
North Dakota.				Vanceburg		15	
Berlin			1	Van Wert		14	13
Bismarek			2	Vermillion		15	
Bottineau			2	Vickery		14	
Dickinson			1	Warren			14
Ellendale			7	Warsaw		12	
Fargo			7	Waverly		6	
Fort Yates			7	Waynesville		10	
Gallatin			7	Westerville		15	
Jamestown			7	Weymouth		11	
Kelso			7	Wheeler		18	
Larimore			6	Wooster		7	
McKinney			2	Youngstown †		7	14
Milton			3	Oklahoma.			
Napoleon			7	Alva		8	
New Salem			2	Anadarko †		31	
Portal			2	Arapaho		8	
University			28	Burnett		9	
Wahpeton			7	Clifton		8	
Wild Rice			7	Fort Sill †		30	
Williston			2	Fort Supply		7	
Ohio.				Guthrie		8	
Akron †		15		Mangum		30	
Annapolis †		7		Oklahoma		8	
Arcanum		10		Pond Creek		8	
Athens		7		Stillwater		8	
Atwater		7		Winnview		8	
Bangorville		7	31	Oregon.			
Bellefontaine		10		Arlington †		7	
Bethany †		6		Ashland		6	
Binola		15		Aurora		6	
Bissels		15	14	Baker City		6	
Bladensburg		14		Bandon		6	
Bloomington		10		Burns			19
Bowling Green		14		Canyon City		27	
Bucyrus †		14		Cornelius		5	
Cambridge		9		Corvallis		11	
Camp Dennison		15		Crook			19
Cardington			12	Detroit		7	26
Carrollton †		9		Forest Grove		6	
Cedarville		15		Glenora		9	18
Celina		9		Grants Pass †		6	
Cherry Fork		9		Heppner		7	

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
<i>Oregon—Cont'd.</i>				<i>South Carolina—Cont'd.</i>			
Hood River (near).....	9			Georgetown.....	15		
Hubbard.....	17			Greenville.....	12		
La Grande†.....	6			Greenwood.....	15		
Pendleton.....	7			Hardeeville.....	15		
Portland.....	19			Hollands Store.....	15		
Roseburg.....	6			Little Mountain.....	12		
Salem†.....	11			Longshore.....	12	15	
Sparta†.....	6			McCormick.....	15		
The Dalles.....	7			Pinopolis.....	16		
<i>Pennsylvania.</i>				Shaws Fork.....	12	15	
Aqueduct†.....	12			Society Hill.....	15		
Blooming Grove.....		14		Statesburg.....	15		
Carlisle.....	12			Trenton.....	15		
Cassandra.....		14		Trial.....	15		
Chambersburg†.....	12			Watts.....	15		
Clarion.....		14		Yorkville.....	14		
Coatesville.....	12			<i>South Dakota.</i>			
Du Bois.....		15		Alexandria.....		7	
Dyberry.....		14		Ashcroft.....		6	
Easton.....	7			Bowdle.....		7	
Edinboro.....	15			Clark.....		7	
Emporium.....		14		Elandreau.....		3	
Grampian.....	7	14		Fort Meade.....		7	
Greenville.....	7	13		Fort Sully.....		2	
Hamburg†.....	16			Frankfort.....		7	
Harriaburg.....		14		Gary.....		5	
Holidaysburg.....		14		Highmore.....		3	
Huntingdon.....	12			Hotch City.....		7	
Johnstown.....	11	13		Huron.....		3	
Kennett Square.....	7	15		Kimball.....		7	
Kilmer.....	8	14		Millbank.....		7	
Lancaster†.....	16			Northville.....		7	
Lebanon.....	12			Oelrichs.....		28	
Le Roy.....		14		Piedmont.....		27	
Lewisburg.....	16			Pierre.....		7	
Lycippus†.....	15			Rapid City.....		2	
Oil City.....		14		Rosebud.....		7	
Parker.....		14		Sioux Falls.....		29	
Philadelphia.....	12			Spearfish.....		7	
Phoenixville.....	15			<i>Tennessee.</i>			
Pittsburg.....	7	14		Andersonville.....		6	
Pottstown.....	12			Ashwood.....		10	
Quakertown.....	12			Byrdstown.....		6	14
Ridgway.....		14		Chattanooga.....		6	15
Saegertown.....		14		Clarksburg.....		5	10
Shinglehouse.....		14		Covington.....		9	
Smethport.....		14		Florence Station.....		5	9
Somersett.....	6			Franklin.....		5	10
South Eaton.....	16			Greenville.....		11	14
State College.....		14		Hohenwald.....		5	9
Towanda.....		14		Jacksboro.....		6	15
Uniontown.....	12			Johnson City.....		5	15
Westtown.....	12			Knoxville.....		6	15
York.....	7	14		Lynnville.....		6	10
<i>Rhode Island.</i>				Memphis.....		9	
Bristol.....	19			Milau.....		6	
Kingston.....		16		Nashville.....		6	15
Narragansett Pier.....	15			Newport.....		11	15
Providence.....	12	16		Nunnally.....		9	
<i>South Carolina.</i>				Riddleton.....		10	14
Aiken.....	15			Rogersville.....		11	14
Blackville.....	15			Rugby.....		5	6
Blenheim.....	15			Springdale.....		5	11
Branchville.....	15			Tallahoma.....		4	
Camden.....	15			Waynesboro.....		9	
Central.....	15			<i>Texas.</i>			
Cheraw.....	15			Arlington.....		30	
Columbia.....	15			Arthur City.....		7	
Conway.....	15			Aurora.....		30	
Cross Hill.....	15			Brady.....		30	
Effingham.....	14			Brazoria.....		30	

Dates of first light and heavy frosts and snow—Continued.

State and station.	First frost.			State and station.	First frost.		
	Light.	Heavy.	Snow.		Light.	Heavy.	Snow.
<i>Texas—Cont'd.</i>				<i>Washington—Cont'd.</i>			
College Station.....	30			East Clallam.....	17		
Columbia.....	30			Everett†.....	2		
Corsicana.....	31			Fort Simcoe.....	18		
Dallas.....	31			Kennewick†.....	9		
Devine.....	30			Lakeside†.....	18		
El Paso.....		30		Lapush.....	12		
Estelle.....		30		Madrone.....	10		
Fort Hancock†.....		21		Olga.....	18		
Fort Stockton.....	29			Pine Hill.....	6		
Grape Vine.....	9			Pullman.....			30
Hale Center.....	8	29		Pysht.....	7	18	
Hallettsville.....	30			Tacoma.....	18		
Happy.....	8			Union City.....	21		
Houston.....	30			Walla Walla.....	7	20	
Jefferson.....	27	30		Waterville.....			23
Leakey.....	29			West Ferndale.....	6	12	
Menardville.....	29			<i>West Virginia.</i>			
Midland.....	29			Beverly.....	15	14	
Mountain Spring.....	9			Bloomery.....	12		
New Braunfels.....	30			Buckhannon.....			31
Palestine.....	30			Creston†.....	10		
Roby.....		30		Davis.....			14
Round Rock.....	30			Elkhorn.....	6	15	
<i>Utah.</i>				Ella.....	15		
Cisco†.....	2			Glenville.....	12		
Loa.....		31		Grafton.....	15		
Manti†.....	13			Huntington†.....	8		
Moab†.....	8			Madison.....	9	10	
Mount Pleasant†.....	28			Martinsburg.....	12	15	
Ogden†.....	28			Morgantown†.....	9		
St. George†.....	1			New Cumberland†.....	15		
Salt Lake City.....		27		New Martinsville.....	9		
Soldier Summit.....		20		Nurtallburg†.....	15		
<i>Vermont.</i>				Parkersburg†.....	15		
Brattleboro†.....	19			Point Pleasant.....	9		
Burlington.....		14		Powellton.....	14		
Enosburg Falls.....		15		Sandyville.....	9		31
St. Johnsbury.....		15		Tannery.....	12		
Strafford.....		15		Wheeling†.....	15		
Vernon†.....		12		<i>Wisconsin.</i>			
Woodstock.....		16		Belleville.....			4
<i>Virginia.</i>				Beloit.....			14
Ashland.....	12	12		Black River Falls.....			9
Bedford City.....	12			Chilton.....			9
Big Stone Gap.....	5	10	31	Depere.....			11
Birdsnest.....	16			Green Bay.....			13
Blacksburg.....	6	12		Koepenick.....			8
Buckingham†.....		15		La Crosse.....			17
Dale Enterprise.....	7	15		Lancaster.....			9
Hot Springs.....	6	31		Madison†.....			14
Irwin†.....		15		Manitowoc.....			9
Lexington.....	12	15		Medford.....			14
Lynchburg.....	12	16		New Holstein.....			7
Norfolk.....	16			Oconomowoc.....			6
Nottoway.....	15			Osoeola.....			13
Petersburg.....	16			Oshkosh†.....			30
Richmond.....	15			Pepin.....			9
Rocky Mount†.....	15			Port Washington†.....			13
Salem.....	15			Sharon.....			8
Smithville.....	15			Waukesha.....			13
Spottsville.....	15			<i>Wyoming.</i>			
Stanardsville.....	15			Big Horn Ranch.....			6
Staunton.....	7	12		Camp Pilot Butte.....			20
Stephens City.....	15			Cheyenne.....			28
Warsaw.....	12			Fort McKinney.....			28
Whittles Depot†.....	15			Laramie.....			29
Wytheville†.....	11			Lusk.....			27
<i>Washington.</i>				Saratoga.....			27
Blaine†.....	6			Sheridan.....			27
Bridgeport.....	10			Sundance.....			2
Chehalis.....	18						

HUMIDITY.

The quantity of moisture in the atmosphere at any time may be expressed by means of the weight contained in a cubic foot of air. This is usually known as the absolute measure and is equivalent to giving the tension of the vapor, the vapor pressure, or the temperature of the dew-point. The mean dew-points for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, are given in Table I. These vapor tensions and the resulting dew-points, absolute humidities, and relative humidities are all deduced from observations of the wet-bulb thermometer by means of formulæ and tables that were first devised by August and subsequently modified by Regnault, 1845, and Ferrel in 1885, but which are still considered to be open to further im-

provement. In a general way the dew-points given in Table I are probably slightly lower than they should be, owing to the omission since 1887 of a correction for barometric pressure. There is also an uncertainty in the psychrometric formula which is only just now beginning to be understood, by virtue of which at temperatures below freezing the dew-points and the humidities are higher than they should be. For these reasons the monthly averages of the dew-points and relative humidities are subject to some uncertainty.

AVERAGE HUMIDITY.

The temperature of the wet bulb of the psychrometer is the temperature at which evaporation is going on from a special